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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

LIST OF PUBLICATIONS AND PATENTS

of the
Northern Utilization Research Branch
Peoria, Illinois

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

GLYCERIDE STRUCTURE OF VEGETABLE OILS BY COUNTERCURRENT DISTRIBUTION. I. LINSEED OIL.

H. J. Dutton and J. A. Cannon.
Jour. Amer. Oil Chem. Soc. 33(1): 46-49. January 1956. Published in Paint Industry Magazine 71(6): 8,10,12 and 49 (June 1956) under the title, "Glyceride Structure of Vegetable Oils by Countercurrent Distribution".

On the basis of the qualitative and quantitative glyceride isolations by countercurrent distribution, it is concluded that linseed oil is more accurately described by the random pattern than by the strict even pattern.

USES OF GELSOY IN PREPARED FOOD PRODUCTS.

Elmer F. Glabe, Pauline Goldman, Perry W. Anderson, Lewis A. Finn, and Allan K. Smith.
Food Tech. 10(1): 51-56. January 1956.

Gelsoy shows promise as a water-binding material in prepared, comminuted meat products, such as frankfurters, meat loaf, and canned meat. Sodium hexametaphosphate increases the water- and fat-binding capacity of Gelsoy. A spray-dried mix consisting of Gelsoy, nonfat dry milk solids, sugars, vegetable oil, vegetable gum, and modified starch, when reconstituted with water is frozen directly without further homogenization to provide a lowfat frozen confection of good quality flavor.

RECORDING APPARATUS FOR MEASURING OXYGEN ABSORPTION.

E. B. Lancaster, E. D. Bitner, and R. E. Beal.
Jour. Amer. Oil Chem. Soc. 33(1): 36-38. January 1956.

Two electrical circuits, which are capable of sensing the height of a column of mercury and of translating this information into direct current voltage, are described. In one of them, the fluid need not be mercury. The circuits have been applied to mercury manometers which were attached to flasks containing a fat and gaseous oxygen. When the flask is heated, the fat absorbs oxygen and the voltage change due to the resultant drop in mercury level is continuously recorded. The curves thus produced may be interpreted as a measure of the stability of the fat.

STEROIDAL SAPOGENINS. XXXII. ATTEMPTED MICROBIOLOGICAL OXIDATION.

R. F. Miniger and M. E. Wall, EU; R. G. Dworschack and R. W. Jackson, NU.
Arch. Biochem. and Biophysics 60(2): 427-432. February 1956.

A wide variety of microorganisms and culture conditions were employed in an attempt to hydroxylate sarsasapogenin, diosgenin, and Δ4-tigogenone, three readily available sapogenins. Hydroxylation conditions similar to those used with progesterone were used. Although one of the sapogenins tested had the Δ4-3-keto moiety of progesterone, none of the organisms on any of the substrates produced a modified sapogenin. The conclusion must be made that steroidal sapogenins are not readily hydroxylated by microorganisms.

CHARACTERIZATION OF DEXTRANS FROM FOUR TYPES OF *LEUCONOSTOC MESENTEROIDES*.

Allene Jeanes, W. C. Haynes, and C. A. Wilham.
Jour. of Bact. 71(2): 167-173. February 1956.

Correlation was established between the chemical and physical properties of twenty-three dextrans and the colonial type of the strain of *Leuconostoc mesenteroides* by which each was produced. These strains were representative of the four colonial types into which Professor C. S. McCleskey and coworkers have classified the *L. mesenteroides* occurring in Louisiana sugar cane juices. These correlations establish for the first time that relationships exist between the cultural and morphological characteristics of the dextran-producing organism and the properties of the dextran it produces. These observations make it possible to select a strain from natural sources for production of a dextran which will have properties within certain predictable limits.

Dextrans from many strains of *L. mesenteroides*, obtained from sources other than Louisiana sugar cane juices, were shown to have properties comparable with those characteristic of dextrans from the colonial types of McCleskey.

ESTABILIDAD DE LAS MEZCLAS ALCOHOL-GASOLINA
STABILITY OF ALCOHOL-GASOLINE BLENDS.

Janina Nowakowska, Carl B. Kretschmer, and Richard Wiebe.
Boletin de la Asociacion Nacional de Ingenieros Agronomos (Spanish Journal)
No. 70: 3-7. February 1956.

Precautions are necessary to prevent loss of alcohol, during storage and handling of blends containing 2% of alcohol, such as are used to prevent carburetor icing. With blends containing 10% or 25% of alcohol, the possibility of separation into two layers caused by accidental addition of water is not so serious as formerly supposed, since the lower, water-rich layer either will be too small in amount to cause much trouble, or will itself be an acceptable fuel for the engine.

A SCRAPER FOR TRANSFERRING LARGE AMOUNTS OF BACTERIAL GROWTH.

Ralph W. Kuehne.
Chemist-Analyst 45(1): p. 26. March 1956.

A scraper has been developed for transferring large amounts of growth for making heavy bacterial suspensions. The scraper is easily constructed from 23-gauge Nichrome wire.

HYBRIDIZATION STUDIES INVOLVING *SACCHAROMYCES LACTIS* AND *ZYGOSACCHAROMYCES ASHBYI*.

Lynferd J. Wickerham and Kermit A. Burton.
Jour. of Bact. 71(3): 290-295. March 1956.

A new procedure for hybridizing yeasts not previously hybridized is presented. The two species are mixed on a sporulation medium on which they produce simultaneously those types of cells most likely to hybridize. The mixture is transferred to fresh sporulation medium every ten days until approximately four serial transfers have been made. It is then necessary to isolate the hybrids from their parents. Pigmentation is the characteristic by which hybrids were distinguished from their parents in this study. On mating weakly pigmented parents, strongly pigmented hybrids were produced. The hybrids were then studied to learn what characteristics had been inherited from each parent.

HYBRIDIZATION STUDIES INVOLVING *SACCHAROMYCES FRAGILIS* AND *ZYGOSACCHAROMYCES DOBZHANSKII*.

Lynfred J. Wickerham and Kermit A. Burton.
Jour. of Bact. 71(3): 296-302. March 1956.

Hybrids were produced by serial transfer on sporulation medium. Parent species were selected which varied in the ability to assimilate and ferment lactose and maltose. Hybrids assimilated both maltose and lactose. The hybrids were separated from the parent species by growing them in a series of cultures in which lactose was the only source of carbon; thus the parent that does not assimilate lactose did not grow and was thereby eliminated from the mixture. Then the culture was grown successively in a medium containing only maltose as the carbon source, consequently excluding the other parent which does not assimilate maltose. Then only the hybrids remained.

VISCOMETRIC PROPERTIES OF HIGHER FATTY ACIDS AND THEIR DERIVATIVES.

Howard M. Teeter and John C. Cowan.
Jour. Amer. Chem. Soc. 33(4): 163-169. April 1956.

The relationship between chemical structure and viscosity for higher fatty acids and their derivatives and the effect of chemical reactions such as polymerization, oxidation, and condensation on viscosity are discussed. Applications of fatty acids and derivatives as lubricants or lubricant additives are summarized.

ION EXCHANGE SEPARATION OF MORPHINE PRIOR TO ITS DETERMINATION IN *PAPAVER SOMNIFERUM*.

C. H. Van Etten, F. R. Earle, T. A. McGuire, and F. R. Senti.
Analyt. Chem. 28(5): 867-870. May 1956.

No rapid, accurate method could be found for the determination of morphine in the poppy plant or extracts from it; a new procedure was developed for isolation and purification of morphine by ion exchange methods. The morphine was finally measured by the color it produces with nitrous acid, by its ultraviolet absorption, or by titration. The method when applied to pure morphine gave an average recovery of 98% with a standard deviation of 1.9 on 18 analyses of samples that contained from 5 to 20 mg. of morphine. The analytical values obtained on opium and various extracts from the poppy plant were lower than those obtained by a colorimetric and a solvent extraction method, but 10 to 40% higher than those obtained by methods in which morphine was isolated by crystallization. Colorimetric methods applied to extracts of the poppy plant without prior separation of the morphine from interferences will give high results.

NEED FOR RESEARCH ON SOYBEAN OIL MEAL.

L. L. McKinney and J. C. Cowan.
Soybean Digest 16(6): 14-16. April 1956. Part I.
Soybean Digest 16(7): 14-16, 18. May 1956. Part II.

The current knowledge of the vitamin content, estrogenic activity, saponin activity, essential amino acid content, and protein value of soybean oil meal is reviewed. The economic importance of research designed to improve the feed value of this meal is discussed.

CONTROLLED DEGRADATION OF WAXY CORN STARCH BY MALT ALPHA-AMYLASE.

R. L. Lohmar, F. B. Weakley, and G. E. Lauterbach.
Cereal Chem. 33(3): 198-206. May 1956.

A method has been developed for the production of dextrins of given inherent viscosity by the action of malt alpha-amylase on waxy-corn starch pastes. Reproducibility is accomplished by controlling the viscosity of the reaction mixture. Empirical relationships have been found between viscosity of the dextrin, viscosity of the conversion paste, and time of conversion. These relationships were discovered in the course of experiments designed to find dextrins suitable for use as red blood cell precipitants in the fractionation of blood. Dextrins having inherent viscosities ranging from 0.13 to 0.46 have been prepared. Some of these are suitable as red blood cell precipitants.

L'ALCOOL ET LE DEGIVRAGE DES CARBURATEURS.
CARBURETOR DE-ICING WITH ALCOHOLS.

Carl B. Kretschmer, M. M. Gilbert, W. B. Roth, and Richard Wiebe.
Industries Alimentaires et Agricoles (French Journal) 73(5): 343-346. May 1956.

The use of ethyl alcohol as a gasoline additive to prevent carburetor icing was studied in a laboratory engine setup. Ethyl alcohol was found slightly superior to isopropyl alcohol, which is now in commercial use for this purpose. However, losses in storage and handling would be somewhat greater with ethyl than with isopropyl alcohol.

DETERMINATION OF DIALDEHYDE UNITS IN PERIODATE-OXIDIZED CORNSTARCHES.

J. C. Rankin and C. L. Mehltretter.
Analyt. Chem. 28(6): 1012-1014. June 1956.

In a study of periodate oxidized starches, covering the entire range from complete to very slight extents of oxidation, a reliable analytical method was required for estimation of carbonyl groups in the oxystarch. The relatively rapid sodium borohydride reduction method used by Lindberg and Misiorny (Svensk papperstidning, 55, 13 (1952)) for reducing monosaccharides was found to be convenient and applicable without modification to the analysis of the oxystarch samples. The validity of the results was substantiated by use of a chemical method differing in principle, but which gave values for carbonyl content in close agreement with those obtained by borohydride reduction. In the second procedure, instead of direct measurement of aldehyde groups in the oxidized units, the unchanged anhydroglucose residues are oxidized by additional sodium metaperiodate and the percentage of oxidized units obtained by the difference. Conditions used for carrying out this reaction without significant over-oxidation, and comparative results obtained by the two different methods, are discussed.

REACTIONS OF CONJUGATED FATTY ACIDS. III. KINETICS OF THE DIELS-ALDER REACTION.

L. E. Gast, E. W. Bell, and H. M. Teeter.
Jour. Amer. Oil Chem. Soc. 33(6): 278-281. June 1956.

A kinetic study of the reaction between diethylazodicarboxylate and *trans,trans*-9,11-linoleic acid was carried out in various solvents and in the presence of certain acidic catalysts. Specific rate constants were obtained at two temperatures in most solvent systems and information on the activation energy of the reaction was obtained.

CRYSTALLINE METHYL α-ISOMALTOSIDE AND ITS HOMOLOGS OBTAINED BY SYNTHETIC ACTION OF DEXTRANSUCRASE.

R. W. Jones, Allene Jeanes, C. S. Stringer, and H. M. Tsuchiya.
Jour. Amer. Chem. Soc. 78(11): 2499-2502. June 5, 1956.

A new series of reference compounds, α-methyl isomaltoside (methyl 6-[α-D-glucopyranosyl]-α-D-glucopyranoside) and its homologs, have been synthesized by the action of the enzyme NRRL B-512 dextransucrase. The synthesis mixture was fractionated by chromatography on a carbon-Celite column. The products (D.P. 2 through 5) were isolated as pure crystalline compounds. They were identified and characterized by periodate oxidation, alkoxyl analyses, R_f values, melting points, optical rotations, and X-ray analyses.

THE PREPARATION, PROPERTIES AND STRUCTURE OF THE DISACCHARIDE LEUCROSE.

Frank H. Stodola, E. S. Sharpe, and H. J. Koepsell.
Jour. Amer. Chem. Soc. 78(11): 2514-2518. June 5, 1956.

Leucrose has been prepared from sucrose in 7.9% yield by the action of dextransucrase derived from the bacterium *Leuconostoc mesenteroides* (NRRL B-512F). Complete methylation of leucrose phenylosotriazole produced a hepta-O-methyl derivative which on hydrolysis with acid gave 2,3,4,6-tetra-O-methyl-D-glucose and 3,4,6-tri-O-methyl-D-fructose phenylosotriazole. The disaccharide was shown to belong to the α-glucosyl series. On the basis of these data the configuration of leucrose has been established as 5-O-α-D-glucopyranosyl-D-fructose.

LIST OF PUBLICATIONS AND PATENTS--OILSEEDS AND RELATED SUBJECTS.
U.S. Dept. Agr. ARS-71-5, Supplement 1, March 2, 1956. 3 pp.
(Processed) March 30, 1956.

BIBLIOGRAPHY ON ALCOHOL PRODUCTION AND USE OF AGRICULTURAL CROPS AS A SOURCE OF MOTOR FUELS.
U. S. Dept. Agri. ARS-71-7, March 1956. 4 pp. (Processed) March 30, 1956.

LIST OF PUBLICATIONS AND PATENTS, Agricultural Residues, Chemical and Physical Uses, and Related Subjects.
U. S. Dept. Agri. ARS-71-8, March 1956. 8 pp. (Processed) May 3, 1956.

LIST OF PUBLICATIONS AND PATENTS, Pulping, Papers, and Related Subjects.
U. S. Dept. Agri. ARS-71-9, March 1956. 6 pp. (Processed) May 3, 1956.

CONTRACT RESEARCH PUBLICATIONS

(Report of research work done by an outside agency under contract with the U. S. Department of Agriculture and supervised by the the Northern Utilization Research Branch of the Agricultural Research Service.)

STUDIES ON TRICHLOROETHYLENE-EXTRACTED FEEDS. VIII. THE RELATIVE RESISTANCE OF AVIAN SPECIES TO THE TOXIC FACTOR IN TRICHLOROETHYLENE-EXTRACTED SOYBEAN OIL MEAL.
E. G. Hill, K. P. Misra, T. H. Canfield, E. L. Johnson, V. Perman, W. R. Pritchard, J. H. Sautter, and M. O. Schultze. University of Minnesota, St. Paul, Minnesota.
Poultry Science 35(3): 686-692. May 1956.

STUDIES ON TRICHLOROETHYLENE-EXTRACTED FEEDS. IX. EXPERIMENTS WITH SWINE FED TRICHLOROETHYLENE-EXTRACTED SOYBEAN OIL MEAL.
L. E. Hanson, W. R. Pritchard, C. E. Rehfeld, V. Perman, J. H. Sautter, and M. O. Schultze. University of Minnesota, St. Paul, Minnesota.
Jour. of Animal Science 15(2): 368-375. May 1956.

PATENTS

These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U.S. Patent Office, Washington, D.C.

PRODUCTION OF FRUCTOSE.

Harold J. Koepsell, Richard W. Jackson, and Clarence A. Hoffman.
U. S. Patent 2,729, 587. January 3, 1956.

Sucrose is subjected to the action of dextransucrase whereby the molecule is split into its components, dextrose and fructose. The dextrose is utilized by dextransucrase in the synthesis of dextran; the fructose remaining as such in the synthesis medium. It is recovered in a pure form and in substantial quantities by applying known methods of separation.

POLYMERIZATION PROCESS USING BORON FLUORIDE.

C. Bradford Croston, Howard M. Teeter, and John C. Cowan.
U. S. Patent 2,729,658. January 3, 1956.

Long chain fatty acids or mixtures are polymerized by heating with boron trifluoride.

AGRICULTURAL RESIDUE ABRASIVES.

Thomas F. Clark
U. S. Patent 2,733,138. January 31, 1956.

Ground nut shells, rice hulls and other agricultural residue grits are incorporated as the principal ingredient in resin-bonded grinding and finishing wheels for working the softer metals.

CONTROLLED ENZYMOLYSIS OF HIGH-AMYLOPECTIN STARCH.

Rolland L. Lohmar, Jr., Francis B. Weakley, and George E. Lauterbach.
U. S. Patent 2,738,305. March 13, 1956.

A starch consisting essentially of amylopectin is hydrolyzed with α-amylase. Dextrins of predetermined properties are obtained by following the hydrolysis viscometrically. The invention makes possible the reproducibility of dextrins having desired properties.

METHOD FOR THE RECOVERY OF SWEET CORN POLYSACCHARIDES.

Rolland L. Lohmar, Jr., and George E. Lauterbach.
U. S. Patent 2,740,733. April 3, 1956.

Comminuted sweet corn is extracted with an aqueous solvent (water) for a sufficient time to dissolve sweet corn polysaccharides. Water soluble proteins are separated from the solution by first heating the solution to a temperature of 105° to 140° C. to coagulate most of the protein. The dissolved polysaccharides are precipitated by adding a lower aliphatic alcohol (ethanol) at a pH of 8.0 to 10.0, and are recovered by filtration or centrifugation.

LACTAM OF N(β-AMINOETHYL) CHELIDAMIC ACID.

Arthur W. Schwab.
U. S. Patent 2,740,786. April 3, 1956.

The compound possesses a novel basic ring system, 1,4-diazabicyclo (4.4.0) decane. It is prepared by reacting ethylenediamine with chelidonic acid followed by treatment with acid.

THE EXTRACTION AND RECOVERY OF ALKALOIDS.

Charles L. Mehltretter and Francis B. Weakley.
U. S. Patent 2,740,787. April 3, 1956.

Dried poppy capsules are extracted with an aqueous solution of an alcohol such as water-saturated butanol, and opium is obtained from the extract by adsorption on a sulfonated coal-type ion exchange resin.

ENZYMATIC PREPARATION OF HIGH LEVULOSE FOOD ADDITIVES.

Julian Corman, Henry M. Tsuchiya, and Charles S. Stringer.
U. S. Patent 2,742,365. April 17, 1956.

A sweetening and thickening agent for foods is prepared by subjecting an aqueous solution of sucrose to the action of dextransucrase. The product is an aqueous solution of dextran and levulose, which may be used directly as a food additive.

PRODUCTION OF DEXTRANASE.

Henry M. Tsuchiya, Allene R. Jeanes, Helen M. Bricker, Carl A. Wilham.
U. S. Patent 2,742,399. April 17, 1956.

An enzyme capable of hydrolyzing dextran is produced extracellularly by cultivating a Penicillium or a Spicaria organism in a medium containing dextran.

PITH SEPARATION AND SUGAR RECOVERY FROM BAGASSE.

Elbert C. Lathrop.
U. S. Patent 2,744,037. May 1, 1956.

Bagasse as it occurs in the usual sugar cane mill circuit is treated to bring the moisture content between 65 to 85 percent and then subjected to an internal scrubbing treatment as by charging through an attrition mill with wide-set plates to loosen adhering pith particles. The mixture is then freed of moisture, and the dried pith particles separated from the fiber by screening.

PREPARATION OF PHYTIC ACID FROM CALCIUM MAGNESIUM PHYTATES.

John C. Cowan and Cyril D. Evans.
U. S. Patent 2,750,400. June 12, 1956.

Phytic acid is prepared from crude phytin by dissolving the phytin in acid solution, such as hydrochloric acid. The acid solution is passed through a bed of cation exchange material to convert it to a solution of free phytic acid in the mineral acid. This solution is further treated as by stripping to separate the two acids.

DEWATERING OF PULP.

Elbert C. Lathrop.
U. S. Patent 2,750,855. June 19, 1956.

Water suspension of cohesive pulpy materials (bagasse pith) are partially dewatered in a revolving screen constructed with an undulating outer shell which induces the formation of accretions thus rendering the screen self-cleaning.

TREATMENT OF EXTRACTION LIQUORS FROM POPPY STRAW.

Hanns G. Maister.
U. S. Patent 2,752,350. June 26, 1956.

Poppy capsule material is extracted with alkaline isobutanol-water mixtures. The extract is distilled, water being added to the distilland to prevent the precipitation of wax in the still. Wax is extracted with aqueous alkali to recover more alkaloids.